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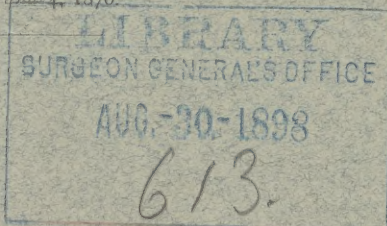
OTOLOGICAL REVIEW.

BY

CLARENCE J. BLAKE.

Reprinted from the "Archives of Ophthalmology and Otology,"

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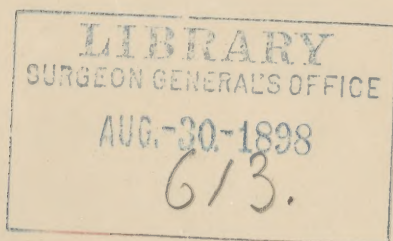
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OTOLOGICAL REVIEW

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Received from the University of California, San Francisco, California

Published by the American Otological Society, San Francisco, California

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By CLARENCE J. BLAKE, BOSTON.

I. *Johannes Ranke*.—Wahre Hörstäbe und Hörzellen im Ohre von Weichthieren. Archiv f. microscop. Anat., XII., 3, 1876.

II. *Weber-Liel*.—Experimente betreffend die Frage der Uebertragung der Schallwellen auf's Labyrinth in Fällen von Synostose der Steigbügelvorhof-Verbindung. Monatsschr. f. Ohrenheilk., II., 1876.

III. *R. Wharry*.—Otitis interna following possible scarlet fever, extensive necrosis of temporal bone, secondary circumscribed meningitis, abscesses in lungs, emphysema and pericarditis. Med. Times and Gazette, London, Sept., 1876.

IV. *Ladreit de Lacharrière*.—De quelques affections herpétiques de l'oreille qui provoquent le plus souvent la surdité. Annales des Mal. de l'Oreille et du Larynx, pp. 175-188, 1875.

V. *Guerder*.—Angine, catarrh de l'oreille moyenne. Irritation de la chorde du tympan. Ann. des Mal. de l'Oreille et du Larynx, Mai, 1876.

VI. *V. Urbantschitsch*.—Geschmacksanomalien bei Otitis Media Purulenta. Anzeiger d. k. k. Akad. d. Wissensch. Wien, April, 1876.

VII. *Anton Steinhausen*.—Die Theorie des Binauralen Hörens. Wien, Carl Gerold's Sohn, 1877.

VIII. *Rayleigh*.—Determination of the direction of a sound source. Nature, 1876.

IX. *L. Turnbull*.—A new artificial membrana tympani. Phila. Med. and Surg. Reporter, Dec., 1876.

X. *Guisepppe Sapolini*.—Nouvel instrument pour l'extraction des corps étrangers du conduit auditif externe. Annales des Mal. de l'Oreille et du Larynx. Juillet, 1876.

I. In vertebrates the ultimate acoustic fibres in the labyrinth enter cylinder cells as their special terminal structure, which cells terminate at the end projecting into the labyrinthine fluid, either

in a single long rod or in a circle of rods, which give the cells a certain resemblance to ciliate cells.

Similar forms of acoustic terminal structures have been found among the invertebrates only in the cephalopods.* In the lower moluscs such structures are entirely unknown. Ciliate cells with vibrating cilia, which are found in the inner epithelial coat of the auditory vesicle in molluscs, have been considered with more or less certainty as the terminal acoustic organ in these animals. The theory of Helmholtz demands, however, as the terminal structure of the auditory nerve, tense structures projecting freely into the labyrinthine fluid, and so constituted as to be set in vibration by the waves communicated to the fluid in which they are bathed. The ciliate structures, set in vibration by forces acting upon the cells, appear unfitted to act simultaneously as a passive, sympathetic acoustic apparatus ; and this view has given rise to the question as to whether the ciliate cells could really exercise the function ascribed to them. In the various specimens of heteropods found in such abundance in the Bay of Naples, and especially in the species of the transparent pterotrachea, it was possible to observe during life the true acoustic terminal cells, of cylindrical form, which, crowned with a circle of rods, not only answer the demands of the theory of Helmholtz, but also suggest in their structure the acoustic cells of the organ of Corti.† The rounded acoustic vesicle of these animals hangs on the long acoustic nerve, like a cherry on its stem. In the fluid within floats a large rounded otolith. The epithelial lining of the vesicle consists principally of indifferent epithelial cells, among which are ciliate cells, from the centre of which projects a bundle of vibrating ciliate rods with whip-like extremities. These ciliate cells, less frequent at the point of entrance of the nerve, but larger and armed with bristle-like rods, increase in number towards the opposite end of the vesicle, but diminish in size, so that opposite the nerve are found, in thickly set concentric rows, the smallest ciliate cells, with the shortest and most delicate rods.

* Owsianikow and Kowalevsky, Ueber das Centralnervensystem und das Gehörorgan der Cephalopoden. Mém. de l'Acad. Imp. des Sciences. St. Petersburg, Ser. VII., Tome XI., No. 3.

† Ranke, Der Gehörvorgang und das Gehörorgan bei Pterotrachea. Zeitschr. für wissensch. Zoologie, XXV. Bd. _.

At this point also is observable, on lateral view, a considerable thickening of the wall of the vesicle, including about one-sixth of the inner surface.

The central point of the globular acoustic organ in pterotrachea is represented by a large cylinder cell arising from the vesicular wall by a broad base, and bearing upon its surface a crown of thickly set, stiff, fine rods. The surface has the appearance of a granular cushion, permeated at a right angle by the rods, which may be followed for some distance into the body of the cell. The relation of the acoustic nerve fibres to these rods is especially worthy of note. Before reaching the point of entrance, the fibres of the nerve spread themselves out under the epithelium, and are then directed, in the majority, towards the acoustic organ; they then enter the above-mentioned "central cell," and it is found that each of the rods studding the surface of the cell is connected at its base with one of the fine fibrillæ of the nerve. It is hardly possible to doubt, therefore, that the rods described form a special terminal apparatus of the acoustic nerve, and that the "central cell" is really an acoustic cell.

The central cell is separated by a comparatively broad space from a ring of cylindrical or finger-formed cells, which, crowned as they are with similar rods, may with equal certainty be considered as acoustic cells. This ring is closely surrounded by a circle of thickly set cells, which, from their intimate connection with terminal nerve fibres in large number, may be considered as a ganglionic ring; they are in their turn closely surrounded by numbers of the smallest ciliate cells.

In fresh subjects the stiff rods of the acoustic cells are easily distinguished from the ciliate coverings of the other cells. The acoustic rods are very transparent, uniformly cylindrical, and terminating in a small olivary point.

The cilia are broader at the base, terminate in a fine, vibrating point, and are much more transparent.

On account of the transparency of even the larger specimens of pterotrachea, the functions of the rods can be observed during life, under the microscope, even with a high power—the transparent surface of the body overlying the acoustic organ serving as a thick object-glass. Under the microscope the cilia, which, in a state of rest, lie upon the inner epithelial wall, are seen to erect

themselves on the occurrence of a sudden noise, and to throw the otolith against the acoustic organ. This change in the position of the otolith is effected through the regular diminution in size of the cilia, the smallest serving as a sort of buffer to diminish the force of the direct blow upon the larger and stiffer rods.

The majority of these most interesting observations of Ranke were independently confirmed by Claus,* in a series of similar investigations; the ring of smaller ciliate cells he however describes as true acoustic cells.

The space surrounding the central cell Claus moreover describes as formed by four elastic supplementary cells; while, according to Ranke, this space is covered by a fenestrated elastic membrane, analogous to the lamina reticularis in mammals.

II. In a paper on the function of the membrana tympani secundaria,† and in the papers published in this volume of the *Monatsschrift für Ohrenheilkunde*, Weber-Liel concludes, as the result of experimental investigation, that in cases of synostosis of the stapedo-vestibular articulation, when the patient can hear a loud voice, the transmission of the sound waves to the labyrinth occurs through the membrane of the fenestra rotunda. This opinion had been previously advanced by Voltolini; Politzer, however, being of the opinion that the sound conduction occurred through the bones of the head. One of the experiments made by Weber-Liel would seem to controvert this latter view. A glass tube being glued to the temporal bone, and sound conveyed through it, no movement of the membrane of the fenestra rotunda was observed; while in all other experiments, under different conditions, excursions of the membrane were seen. In two fresh preparations a synostosis of the stapedo-vestibular articulation was artificially created. The cavity of the tympanum was freely opened, so that both the membrane of the fenestra rotunda and the niche of the fenestra ovalis were plainly visible; the malleo-incudal articulation was then fastened by means of wax and wax poured into the depression around the stapes; the incudo-stapedial articulation was also similarly treated—excursions of the ossicula being thus rendered entirely impossible, so that no movement

* C. Claus, *Archiv für Microsc. Anatomie*, Bd. 12, H. 1. Ranke, *Monatsschrift für Ohrenheilkunde*, 1875, 11.

† *Centralbl. für d. med. Wissenschaften*, No. 2 1876.

whatever was observable in the ossicular chain or in the membrane of the fenestra ovalis when the tone of an organ pipe or of the voice was conducted into the external auditory canal.

(The labyrinth having been opened and the parts observed under the microscope, forty diameters.) In a preparation similarly treated, the labyrinth was left intact. No excursions of the ossicula were observed; the membrana tympani, however, exhibited relatively extensive excursions, especially in its posterior superior quadrant. The tympanic cavity was then closed above by a thin cover glass, through which the membrane of the fenestra rotunda could be easily seen. The tones of various organ-pipes being sounded in the external auditory canal, no movement of the membrane of the fenestra rotunda could be observed (under the microscope fifteen diameters). Excursions were immediately visible, however, when the voice was substituted for the organ-pipes and words were either spoken or sung into the ear; these excursions averaged one-half micrometer division in length. The question naturally arises, the stapes being immovable, as to where the compensation for the compression of the fluid in the labyrinth occurs. This, according to Weber-Liel, is furnished either by the aqueductus vestibuli or cochleæ, proof of which he proposes furnishing in a future paper. The connection of the labyrinth with extra-labyrinthine cavities, as indicated by Cotunni, has been treated in a previous paper.*

III. The case reported by Mr. Wharrey, house-physician of St. Bartholomew's Hospital, under the care of Dr. Southey, was that of a boy, fourteen years of age, fairly nourished, but pale and decidedly rickety; the bridge of the nose was flattened, but there were no pegged teeth, nor keratitis, nor other symptoms which would suggest hereditary syphilis.

At the time of admission to the hospital, his expression was anxious; he answered questions but slowly and after hesitation; rather myopic; respirations 28; temperature 99°; pulse 120, irregular; walks, but with some exertion; complains of sore throat; and on the post-pharyngeal wall are dirty yellowish follicular granulations; has been deaf for some years. His present illness began with frontal headache and sore throat nine days before; symptoms of rash not well authenticated; no present desquama-

* Monatsschrift f. Ohrenheilkunde, 1876.

tion; chest fairly well formed and presenting no abnormal physical signs; movements of head restricted in the antero-posterior direction; rotation not so much affected; refers pain to back of head and to glands on either side, which are enlarged. On the following day the hearing was less; there was great pain behind the left ear; parts red, boggy, and tender; sleeps little; partial delirium; respirations 36; temperature 101.8°; pulse 120. On the day following an incision was made behind the ear, liberating much pus, with relief from pain, and diminution of temperature to 100°. On the third day following, offensive discharge from wound; pulse 144; evening temperature 102.2°. The day following, pulse 144; temperature 101.6°; respirations 64; throat red and swollen; tongue dry and brown; pain in left side; free discharge from wound. On the next day, dullness on percussion at the apex of right lung, with bronchial breathing; a pleural friction sound at angle of right scapula; pericardial friction sound; dullness at base of right lung with crepitation.

On the second day following, physical signs in lungs as before; left side of neck very full and tender, with a corresponding fullness in the mouth; very offensive breath; pulse 174; temperature 103.6°; respirations 64.

On the following day, pulse 160; respirations 72; temperature 103°.

From this time on the physical symptoms increased in severity, breathing became more labored, sputum purulent, and the patient died quietly, four days later, without convulsions or paralysis. The autopsy, made three days and a half after death, showed the veins over the left temple enlarged, a fullness beneath the left ear, which on incision revealed a large abscess cavity, at the bottom of which was a large portion of the squamous and part of the petrous bone bare and exposed.

The abscess cavity extended widely in different directions, forwards and inwards to the back of the pharynx and downwards beneath the sterno-mastoid.

The intra-cranial vessels, especially the middle meningeal, were much distended. There was no diffused meningitis, but the dura mater over the petrous bone was injected and roughened, and the layer of bone between it and the abscess cavity was very thin.

The mastoid cells were filled with thick, yellowish matter, and in the jugular fossa was a quantity of the same of the consistence of putty. There was circumscribed empyema on the right side of the chest, extending from the third rib to the sixth; this communicated with a superficial abscess on the lung.

In both lungs, at their surfaces, there were several distinct abscesses, not very large, and filled with creamy pus. The pericardium was universally adherent from inflammation, apparently of not very recent date. The heart, liver, spleen, kidneys, and intestines presented no marked departure from the normal structure.

IV. According to Ladreit de Lacharrière, there are two forms of skin disease which affect the ear and which may lead to deafness; these are eczema and pityriasis. The author's description of the former disease corresponds to that found in the ordinary textbooks.

In the treatment of the chronic form the author gives preference to tar in a fluid state, and objects to the use of ointments or powders when the disease has included the auditory canal, on account of the danger of occluding the passage and preventing the flow of pus or other fluid. For internal medication, arsenic and the water of sulphur springs is recommended.

Pityriasis alba has been frequently observed by the author as affecting the ear, presenting the same symptoms as pityriasis capitis; the disease occurred under his observation only in patients from forty to sixty years of age; at this period of life the hairs in the auditory canal are most fully developed. On removing the grayish pityriasis scales, the skin beneath is found swollen and slightly reddened; the meatus is much narrowed, and the patient complains of throbbing, severe tinnitus, and deafness. In all the cases there was also pityriasis capitis. As compared with cases of aspergillus, the author remarks that, while the latter develops from the depth of the canal outwards, the pityriasis progresses in a contrary direction. In many cases the disease was hereditary. The first necessity in treatment is the removal of the hairs, followed by a local application of a one per cent. solution of corrosive sublimate, sulphur water, etc., and the internal administration of arsenic.

V. The case reported by Dr. Guerder was that of a soldier,

twenty-two years of age, who was attacked with coryza, November 12, 1875, followed by angina. Five or six days later he had diminished hearing of the right ear, accompanied by pain and tinnitus aurium; these latter symptoms soon disappeared, but the deafness remained. At the end of January, 1876, he had a fresh attack of coryza, followed by angina, less intense than the previous attack and lasting only three days; there was, however, a recurrence of the pain in the ear, and a herpetic eruption in the region of the right submaxillary gland; this eruption, very confluent, covered a space of four by two and one-half centimetres. The pain in the ear was sharp and lancinating, compared by the patient to the pricking of needles; they extended outwards to the tragus towards the eruption, and were accompanied by salivation. They exhibited several exacerbations during the day, especially towards evening, and the patient could not rest at night. During these exacerbations the salivation was extremely abundant, and the deafness more intense. Pressure had no influence upon them. There was no sign of stomatitis. This affection, left to follow its own course, soon subsided; but the deafness which remained was made the subject of treatment, and was speedily relieved by the use of the air douche. This case is interesting on several accounts: The radiating neuralgic pains are by no means uncommon in cases of catarrhal inflammation of the middle ear.* In this case a neuritis or perineuritis of the chorda tympani, in its course behind the membrana tympani, resulted in the eruption and the neuralgic symptoms.

The abundant salivation, accompanying these attacks of pain, would seem to confirm the observation of Claude Bernard on the functions of the chorda tympani; and it is in part with reference to these observations that the author has diagnosticated affection of the chorda tympani in this case.

In fifty patients, forty-four having unilateral and six bilateral purulent inflammation of the middle ear, the author instituted experiments on anomalies of taste, using sugar, vinegar, salt, and quinine. In forty-six cases there was functional disturbance of the organs of taste, exhibited in thirty-eight cases as diminution, in three cases as exaggeration, and in five cases exaggeration for

* J. Orne Green, Neuralgia accompanying Aural Affections. Trans. Am. Otological Society.

some substances and diminution for others. There was also in twenty-four cases a corresponding change in the sensation of taste. These anomalies were found to exist most frequently on the side corresponding to the affected ear. In two cases the anomalies of taste disappeared with the cessation of the aural disease.

From these circumstances, as well as from experimental investigation, the relation of the aural disease to the anomalies of taste is established. The medium for this relationship is the chorda tympani and the plexus tympanicus—that is, the anastomosis between the glosso-pharyngeus and trigeminus.

Salivation was also observed as a result of irritation of the N. facialis, which sends fibres to the submaxillary gland through the chorda tympani and to the parotid through the N. petros. superficialis minor.

VI. Prof. Steinhauser's monograph, which is, as it were, a complement of the previous work on the theory of binocular vision, deserves the attention and consideration accorded its predecessor.* The theory of hearing, says the author, in his introduction, may be divided into the monaural and binaural, the first being treated of in the majority of textbooks and considering the structure and functions of the ear; the second, as yet undeveloped, considers the function from the double standpoint of the two ears, and the part which binaural hearing has in the production of symptoms observed in hearing generally. The auricle the author considers as most important to accurate hearing.

According to the direction in which the sound-waves reach the ear, we may designate the direct, indirect, and compound monaural hearing. In the first, the sound-waves pass directly to the ear from the sound source; in the second, they are reflected or conveyed by repetition indirectly to the ear; in the third, the sound-waves reach the ear both directly and by reflection. Direct monaural hearing can of course occur but rarely, as the observer is almost always surrounded by substances and surfaces which reflect or break the sound-waves in varying degree. Viewing the human head from above, and drawing two lines parallel to the surfaces of the auricles, we find that these lines meet in an acute angle at the point of the nose, the lines being continued in a forward direction, we have two lines crossing each other at the

* Die Theorie des Binocularen Sehens. Anton Steinhauser. Wien.

point of the nose (n) and forming an angle (BB), the surfaces of the two auricles being designated by f_1 , and f_2 . According to the direction of the sound source, the following conditions, as regards binaural hearing, may be reproduced:

1. The sound source being within the angle $D n C$, the observer hears directly with both ears simultaneously; there is therefore direct binaural hearing, the range of which is included in the angle $D n C = 2B$.

2. The sound source being within either of the angles $A n D$ and $B n C$, the observer hears with one ear directly and with the other indirectly; there is therefore a compound binaural hearing, included in the angles $A n D$, $B n C$, equivalent to $360 - 4B$.

3. The sound source being within the angle $A n B$, the observer hears with both ears indirectly; there is therefore an indirect binaural hearing included in the angle $B n C = 2B$. The 360 degrees within which the sound source falls may be portioned as follows:

$2B$ degrees to direct binaural hearing, $360 - 4B$ degrees to compound binaural hearing, $2B$ degrees to indirect binaural hearing. The range of direct as also of indirect monaural hearing of course includes 180 degrees. The angle B varies in different individuals naturally, and is also subject to variation from accidental causes.

Every portion of the auricle which conducts by reflection into the ear, the sound wave falling upon it, may be considered, with regard to the direction of the wave, an effective portion of the auricle. The sum of these effective portions for sound waves of certain direction may be considered as forming the effective or functional surface of the auricle. As, therefore, the functional surface of the auricle varies for each direction of the sound wave, the intensity with which the sound is perceived depending upon its size, it follows that, if the intensity of the perception is not changed by rotation of the head (equivalent to variation in position of the sound source), the size of the functional surface of the auricle must be nearly the same for all possible directions of the sound source.

The auricle, therefore, as a curved-reflecting surface, fulfils an

important office, and the special function of its several divisions may yet be fully determined.*

The body of this most interesting monograph is devoted to the more intimate discussion of

1. The theory of direct binaural hearing,
2. The theory of indirect binaural hearing,
3. The theory of compound binaural hearing,

a just review of which would require the reproduction of the diagrams, without which the algebraic formulæ would be valueless, and which is impossible here. The conclusions, however, may be given at length. The 360 degrees included in binaural hearing may be divided into the anterior range of direct, the two lateral ranges of compound, and the posterior range of indirect hearing. With the head immovable, man is accorded favorable conditions, by means of binaural hearing, to determine from sound perception in which of the above-mentioned ranges of hearing the sound source occurs. A certain knowledge of the direction of the sound source, as also a determination of the direction of its movement, if in motion, is possible only so long as the sound source is within the range of direct binaural hearing.

If the sound source is within the range of either the indirect or the compound binaural hearing, a positive knowledge of its direction is attainable only when by turning the head the observer seeks to bring the sound source :

1. Within the range of direct hearing, or better still, in the direction of the best binaural hearing.
2. On the boundary between two ranges of hearing, the direction of this boundary differing in individuals. This measure has the advantage of requiring only a slight movement of the head.
3. In the known direction of the best monaural hearing, this is especially serviceable when the question arises as to whether the sound source is in front of or behind the observer. The angle B, representing the inclination of the surface of the auricle to the direction of audition, has no unimportant bearing upon binaural hearing under certain circumstances.

As this angle varies in different individuals, the results which

* Functions of the Auricle. C. H. Burnett.

follow an augmentation or diminution thereof may be stated briefly as follow :

The greater B, therefore

1. The greater the range of direct binaural hearing ;
2. The smaller the range of compound binaural hearing.

Furthermore,

3. The better or finer the hearing in the visual axis ;
4. The greater the range of indirect binaural hearing.
5. The more uncertain the determination of direction in the range of direct binaural hearing ; finally,
6. The greater will be the possible distinction in the collective intensity of the sound perceived, according to the position of the head.

Finally, it should be noted that apparently unimportant conditions are sufficient to determine the direction of the sound source, so that this power of localization is sometimes falsely ascribed to the hearing power. The more vivid our imagination, the more readily do we see and hear where there is in truth nothing to be either seen or heard.

VII. In connection with the above paper the following review of a lecture by Lord Rayleigh, quoted in "*Nature*," is of interest. After considering the various questions which have arisen as to the method of determining the direction of the sounding body, and showing the futility of attempting to draw comparison between the function of the eye and ear in this respect, the author proceeds to state his experiments as follows : The first experiments were made with the view of determining with what degree of certainty the direction of a sound source could be determined. The observer was placed with the eyes closed in the centre of an open space, on a still evening, and directed to indicate with the hand the direction of the voices of five or six assistants, who constantly exchanged their positions. It was necessary to have several assistants, as it was found that their footsteps were easily heard. The result showed that the direction of a human voice could be easily determined within a few degrees, from the speaking of even a single word or sounding of a vowel. With other sounds the result was different. When the sound source was directly right or left, it could be determined, but it was difficult to decide whether a slight sound—a low whistle, for instance—was

more in front or behind. An experiment with a single tuning-fork failed, because the accompanying noise of sounding it revealed its direction. Two assistants were therefore armed with similar forks and stationed in opposite positions. Both forks were sounded at the same moment, but one only was placed upon its resonator. When the observer was so placed that one fork was directly in front of him and the other directly behind, it was impossible to decide which fork sounded; making a quarter turn, however, so that one fork was to the right and the other to the left, the direction of the sound source was at once known. The possibility of distinguishing a voice from in front from a voice from behind would appear to depend upon the composite character of the sound in a manner as yet unexplained, and for which the functional ability of the second ear is not requisite. Even when the sound comes in a lateral direction, the question is not easy of explanation, as the difference in the intensity with which a lateral sound is perceived by the two ears is very slight. The experiment can be roughly made by stopping one ear and turning backwards and forwards in a circle before a sounding body.

Moreover, the human head, considered as an obstacle to the sound-waves, is hardly thick enough, compared to the wave length, to cast an appreciable sound shadow. The author explains this point by estimating the intensity of the sound, from a distant source, for different points on the surface of a solid globular body. The result depends upon the relation (a) between the wave length and the circumference of the ball. Calling the point on the surface of the ball nearest the sound source the anterior pole, and the opposite point, where the shadow is most intense, the posterior pole, the results as regards intensity are represented in the following table—considering the relative size of the ball and the wave length—by three suppositions.

	Anterior Pole.	Posterior Pole.	Aequator.
$a = 2$	0.690	0.318	0.356
$a = 1$	0.503	0.285	0.237
$a = \frac{1}{2}$	0.294	0.260	0.232

When, for example, the circumference of the ball is only one-half of the wave length, the intensity at the posterior pole is only one-tenth less than at the anterior pole, while the intensity is least in a lateral direction.

When a is smaller than $\frac{1}{2}$, the difference in intensity at the two poles is still less observable, and sinks to about one per cent. when $a = \frac{1}{4}$.

The value of a depends upon the wave length, which may vary between wide extremes, and it is to be assumed that the readiness with which a lateral tone is distinguished diminishes with the depth of the tone. In this connection experiments were made with tuning-forks of 128 v. s.; but no greater difficulty was observed than with forks of 256 v. s.

VIII. The modifications suggested by Dr. Turnbull, in the form of a new artificial membrana tympani, consist in making the stem of steel and covering it with a thin layer of rubber, by melting; at the end of this stem is a light metal ring, similarly protected, and bearing stretched across it a thin rubber disc. One of the advantages claimed for this instrument is that the metal stem is attached, not to the centre, but to the circumference of the membrane.

IX. Dr. Sapolini has added to the already extensive surgical armament for the extraction of foreign bodies from the external auditory canal, an instrument consisting of a tube containing two rods, each of which terminates at the extremity of the tube in a curved blade, resembling the blade of a midwifery forceps, unfenestrated; one of these blades slips over the other, in which position the instrument is introduced, and the blades passed to include the foreign body; one of the rods is then rotated, carrying the outermost blade to the opposite side, in which position traction may be made.

